At Greenwich Midnight

	Pos.	Dist.		Pos.	Dist.
	°	″		°	″
Oct. 10	241·3	50·1	Oct. 21	44·0	46·8
11	28·4	23·6	22	60·8	55·7
12	55·1	61·7	23	200·6	22·4
13	98·7	15·5	24	234·0	65·7
14	229·3	56·8	25	272·4	20·6
15	245·9	42·0	26	47·1	58·0
16	39·0	36·7	27	64·9	48·6
17	57·6	60·4	28	213·4	35·0
18	161·8	12·5	29	236·6	64·7
19	231·7	63·0	30	317·7	14·4
20	254·1	31·6	31	49·7	64·2

The apparent diameter of Mars, assuming the diameter at the mean distance 9″·415, will be 17″·8 on October 10 and 19″·5 on October 31. The value adopted depends chiefly upon the double-image measures, and is smaller than that introduced in Leverrier's Tables of Mars, which was derived from observations with meridian instruments. The period of revolution of *Deimos* is 30h. 17m. 54s., and the mean distance from the centre of Mars 14,500 miles, so that the average orbital velocity is 50 miles per minute. The excentricity appearing to be very small, Prof. Hall assumes a circular orbit for prediction in 1879.

THE FIRST COMET OF 1699.—This comet was observed at Paris by Cassini and Maraldi from February 20 to March 2, and at Pekin by the Jesuit missionary, De Fontenay, from February 17 to February 26. The single orbit which figures in our catalogues was calculated by Lacaille; the following elements by Mr. Hind depending upon the observations of February 19, 24, and March 2, are very similar to Lacaille's, the only noticeable difference being an increase of rather more than 1° in the inclination :—

Perihelion passage, 1699, January 13·3998 G.M.T.

Longitude of perihelion	° 212	′ 8·8
,, ,, ascending node	321	41·5
Inclination	70	36·6
Log. perihelion distance	9·87426	

Motion—retrograde.

The re-examination to a certain extent of the cometary orbits resting upon a single calculation appears by no means a futile work, as was shown by the circumstance pointed out in this column some time since, that Halley had inadvertently given the longitude of the *descending* node of the comet of 1698, in his "Synopsis of Cometary Astronomy," in place of that of the *ascending* node, and the mistake has been continued in all our catalogues.

NOTES

THE latest conflagration at Irkutsk has destroyed all the libraries of the town—the Public Library, the private one of M. Vaghine (which contained the unpublished MSS. of Gedenstrom), and that of the Siberian branch of the Russian Geographical Society, which latter contained a great variety of works about Siberia, some of them being very rare, a great number of works and MSS. on Buddhism, numerous collections of publications of foreign scientific societies (European, Asiatic, and American) who exchanged their publications with the Siberian branch, and a large assortment of works on physical sciences and natural history. The destruction of this library will be a very great loss to science altogether, if a new one be not immediately created. It would be difficult for a man of science inhabiting a great city or even the smallest town in Western Europe to understand the important services which this library—the only one in Central Asia—has rendered in the development of scientific knowledge and in giving a scientific character to the geographical exploration of Siberia. Many scientific men when staying in Irkutsk have largely made use of the library (we may name among them the well-known president of the Berlin Geographical Society, Prof. Bastian, and quote his interesting notice on Irkutsk), and the writer of these lines can testify, from his own experience, how immense were the services rendered by this library to him and to his young friends when they began their studies for scientific geographical explorations of Siberia at Irkutsk, *i.e.*, at a distance of some thousand miles from all intellectual centres. We think that all those who have the further development of scientific exploration at heart, should do their utmost to assist in creating a new and good library in that centre for the exploration of Siberia.

ON August 20 last, the centenary of the birth of Berzelius was celebrated in a fitting manner at Stockholm. All the principal newspapers commented on the event in leading articles, and reminded their readers in enthusiastic terms that through Linnæus and Berzelius Sweden obtained citizen-rights in the world of science. At Väfversunda in the province of Småland, the birth-place of Berzelius, a monument to the great chemist was unveiled on the same day, in the presence of a large concourse of country people.

THE steamship *Faraday*, which has successfully laid the new transatlantic electric cable from Scilly to Newfoundland, returns to Woolwich to take on board the shore end and the cable to be laid from Newfoundland to America. The Siemens electric works at Charlton are just now busy completing the preparation of these parts, which will be ready by the end of this month, when the *Faraday* will be moored in the Thames to receive them.

THE steamer *Dacia* left Greenwich a few days ago in order to lay the second electric cable which is to connect Marseilles and Algiers. When this communication has been established the tariff of telegraphic messages between France and Algeria will be diminished by half, being reduced to 1*d.* a word instead of 2*d.* as now. It is supposed that the augmentation of traffic with the colony will result in an increased income to the Government.

ON September 1 snow fell in the village of Neustadt (Holstein).

A TERRIBLE whirlwind is reported from the village of Hopsten, near Münster (Westphalia). It occurred on August 26, at seven P.M. The largest oaks were uprooted and broken down; many houses were partially destroyed, and *débris* of all kinds marked the path of the atmospheric disturbance, which proceeded in an easterly direction. Strange to say, the most complete calm reigned everywhere around at the time.

PHYLLOXERA has now made its deplorable entry into Italian vineyards. The destructive insect has appeared in the province of Como. The local authorities are making every effort to combat the plague.

IT was proved some time ago by M. de Heen that, for metals belonging to the same natural group, the product of the coefficient of expansion by the absolute temperature of fusion is a constant quantity. In another memoir just presented to the Belgian Academy, M. de Heen inquires how the coefficient of expansion of water varies with the nature and quantity of substances dissolved in it. He proves that there is also a remarkable relation between the coefficient of expansion of organic liquids belonging to the same homologous series and their boiling point; the product of the one by the other is a constant quantity. In connection with this, M. Spring points out that M. Pictet, guided simply by ideas introduced into science by thermodynamics, has come to the same conclusions as M. de Heen. M. Pictet shows (1) that temperature is represented by the length of calorific oscillations of the molecules of a substance; (2) that the temperatures of fusion of solids correspond to equal lengths of oscillations; and (3) that consequently, the product of the lengths of oscillation by the temperatures of

fusion must be a constant number for all solids. As the lengths of oscillation of the molecules of a body are measured by the coefficient of expansion, we see that the result is the same as that reached some time since by M. de Heen, and which is now extended to liquids.

IN a series of experiments recently described to the Vienna Academy, Prof. von Waltenhofen has sought to deduce from a direct measurement of the work done in induction of an electric current in a closed circuit of given resistance, the mechanical equivalent of heat. For induction, a magneto-electric machine was used, whose electromotive force was ascertained to be proportional to the number of revolutions. A dynamometric handle of the newest construction was attached, and it was furnished with an arrangement for receiving the work-diagrams. The induced currents were measured by means of a tangent galvanometer. The results were found to be in satisfactory agreement with Joule's equivalent.

AN interesting communication relating to the photography of spectra has recently been made to the Berlin Academy of Sciences by Herr H. W. Vogel. It is not very difficult to photograph the spectra of incandescent gases if the source of light is an induction spark which is produced by a current with an inserted Leyden jar. The photography of the much fainter spectra obtained by the simple induction-spark presents far more considerable difficulties, and these are the very ones which Herr Vogel has now completely mastered by the employment of so-called gelatine-dry-plates. These plates are remarkable for their extreme sensitiveness, which Herr Vogel has estimated to be at least fifteen times that of the ordinary wet plates. They keep good for years, it seems, and are already obtainable in the trade. By using them Herr Vogel succeeded in fixing the spectra of the little oxygen tubes prepared and studied by Herr Paalzow, thus rendering lines visible in the more refrangible part of the spectrum which cannot be observed by direct vision. The two gentlemen are now engaged in studying these spectra more minutely in company, and will doubtless soon publish the results of their researches.

A VIOLENT shock of earthquake, lasting forty seconds, is reported from the island of St. Thomas (West Indies). It occurred on July 30 at 11.35 A.M.

THE *Temps* publishes a letter from M. Francis Laur, a mining engineer, complaining that the French Parliamentary Commission appointed for preventing the effects of fire-damp, has given no sign of life, although a credit of 50,000 francs was assigned to it, and more than fifty inventors have sent in instruments or methods for examination.

M. FERRY, Minister of Public Instruction, has published an official circular for the better organisation of the bursaries granted after examination to students taking their degrees in the several French universities. These bursaries are of quite recent foundation and present a strong similarity to the sizarships or scholarships in the English universities.

AMONGST European countries there are two where science has been dreadfully neglected up to the present time. For one of these two, viz., Turkey, we are afraid there is not much hope of reformation, at least in its present condition. It is satisfactory, however, that the other one, viz., Spain, seems at last to be awaking from its lethargy with regard to science. Some time ago we had occasion to refer to a commendable *Cronica cientifica*, published annually in two volumes, by Dr. Emilio Huelin, of Madrid. Another publication which appears monthly, the *Revista contemporanea*, of which Dr. Francisco de Asis Pacheco is the editor, has just come under our notice. The last number of this serial contains an excellent article on the sciences in 1879, by Ricardo Becerro y Bengoa, giving a most elaborate account of the work done recently in all branches of science. The publishers are Señores Perojo Hermanos, of Madrid, who also publish *La Naturaleza*, an illustrated science review, in two volumes annually.

THE project of building a canal from Amsterdam to the Rhine (in continuation of the new canal between that city and the German Ocean) has lately been again brought before the Dutch Government. Our readers are aware that the project is not new, and it is easy to see the great advantages its execution would bring to the commerce of Holland generally and of Amsterdam in particular.

AT a recent meeting of the United States Anthropological Society, Mr. F. H. Cushing, who has made an original and experimental study of aboriginal processes in the manufacture of pottery, stone axes, and flint arrow-heads, using only the tools which were within the reach of the aboriginal manufacturers, gave an interesting description of the manner in which flint implements, especially arrow- and spear-heads, were made by the prehistoric inhabitants of this country and Europe, previous to the discovery or introduction of iron. It is the popular impression that flint arrow-heads were all chipped into shape by striking off fragments with a rude stone hammer, and this was the method first tried by Mr. Cushing. He found, however, that it was impossible to imitate in this way any of the finer and more delicate specimens of Indian arrows, and that three out of four even of the coarser forms were broken in the process of manufacture. It was evident, therefore, that the Indians had other and more delicate processes. After many unsuccessful experiments, he accidentally discovered that small fragments could be broken off from a piece of flint with much greater certainty and precision, by pressure with a pointed rod of bone or horn, than by blows with a hammer-stone. The sharp edge of the flint would cut slightly into the bone, and when the latter was twisted suddenly upward a flake would fly off from the point where the pressure was applied in a direction which could be foreseen and controlled. To this process Mr. Cushing gives the name of flaking, to distinguish it from chipping produced by percussion. And its discovery, he considers, removes most of the difficulties which previous experimenters had met with in trying to work flint without the use of iron. Spear- and arrow-heads could in this way be flaked even into the most delicate and apparently fragile shapes with a certainty attainable in no other way, and with a greatly-lessened probability of breakage. Mr. Cushing then described, with the aid of blackboard illustrations, all the steps in the manufacture of an arrow, beginning with the striking off of a suitable flake from the mass of material selected, trimming it roughly with a pebble into a leaf-shape with a bevelled edge, scaling off surface flakes by repeated blows with a hammer-stone upon this edge at right angles to its plane, and finally finishing, pointing, and notching the arrow-head with the bone flaking-instrument previously referred to.

THE Russian Foreign Ministry has just published a very good Russian and Chinese dictionary, by the first translator of the Russian mission at Pekin, M. P. S. Popoff. The work is printed by a new kind of autography devised by M. Alisoff.

M. FERRY has published an order for the appointment of librarians in the establishments of the University. No one is to be appointed except after two years' trial and passing successfully a professional examination. This is to consist of a French dissertation on a given subject of bibliography, and the classification of fifteen works treating of different matters, and belonging to several periods of the history of the art of printing.

THE Musée Scolaire, which had been removed by the Minister of Public Instruction to one of the halls of the Palais Bourbon, is to resume its former situation. The hall in which it had been located is wanted by the questors for the installation of the

Chamber of Deputies which, as is known, is to be transferred to Paris in November next, there to hold its sessions, so long as the Parisians do not oppose it by a revolution.

AT the Stuttgart meeting of the International Geodetic Association in 1878, M. Faye suggested a method of avoiding the flexure of a pendulum-support, viz., that two similar pendulums should be oscillated on the same support with equal amplitudes and opposite phases. The idea was thrown out on the spur of the moment, and was not received with very warm approval. By a mathematical discussion of the method in a paper to the U.S. National Academy (*Silli. Journ.*, August), Mr. Peirce endeavours to prove that the suggestion is as sound as it is brilliant, and offers some peculiar advantages over the existing method of swinging pendulums.

AT the International Alpine Congress at Geneva Prof. A. Favre pointed out the necessity of making measurements of glaciers. The retrocession of glaciers has been general during the last twenty-five years. Prof. Favre is of opinion that this retrocession period will come to an end after some time, and will be succeeded by a period of advance. The German and Austrian Alpine Club, at its last general meeting at Saalfelden, resolved to make the measurements in question on all the glaciers of the Austrian Alps.

THE third volume of Dr. Karl Russ's work on foreign domestic birds, containing the natural history and cultivation of parrots, has just been published by C. Rümpler, of Hanover.

A NEW oil plant (*Lallemantia liberica*) has been acclimatised on the fields of the Agronomical School at Cherson (South Russia). It belongs to the *Labiatæ* family, and is very similar to *Dracocephalum*. The herb attains a height of 1½ to 2½ feet and bears some 2,500 seed-grains, which give a most pure oil, applicable even for culinary purposes. The seeds of this originally Persian plant were first sent to Cherson by Prof. Haberlandt, of Vienna.

WE learn that M. Europeus still continues his most interesting researches into the prehistoric Finnish population of North-Western Russia. During last summer he explored the *koorganes* (mounds) of the province of Olonets, and on the banks of the Oyak river he discovered many bronze implements similar to those brought in by Ujfalvi from the banks of the Irtysh in Siberia. The remains of the Korels in the district of Olonets throw a new light on the geographical distribution of this people. M. Europeus has arrived at the conclusion that during the first centuries of the Christian era the whole of North-Eastern Europe and the north of the Scandinavian peninsula were peopled by tribes of Finnish-Hungarian and Finnish-Ugrian origin, who formed an extensive and strong state. Only the shores of Lake Onega had a purely Finnish population. All skulls in the *koorganes* of the region formerly occupied by Finns, are of the brachycephalic form.

COUNT T. SALVADORI'S great work on Papuan ornithology, "Ornitologia della Papuasia e delle Moluche," is in a forward state, and it is hoped that the first part (containing the Accipitres, Psittaci, and Picariæ) will be ready about the end of the year. The second part will be devoted to the Passeres, and the third to the remaining orders. The total number of species contained in the work will be about 900, the area embraced being the whole of the Austro-Malayan sub-region, with the exception of Celebes and the Timor group of islands.

A RAILWAY is now being built between Tiflis and Baku, and is expected to be completed in about four years.

WE have received the fourth volume of the *Bulletin* of the Société Ouralienne, *i.e.*, the Natural History Society of Ekaterinburg, Russia. The volume contains some interesting data on the flora of the Ural Mountains, by M. G. O. Clerc; also some notes on rain-gauges and on the quantity of rain and snow which falls at Dolmatoff (average computed from observations extending over fourteen years), by the same. Another valuable contribution is by M. N. P. Boulytcheff, and treats of the flora and the fauna of the Irbit District. All these papers are given in the Russian original and in a French translation. An original German paper is by Dr. J. Hann, on the daily course of magnetic declination in Russia, but only the Russian translation is printed.

THE Congress of German Horticulturists which took place at Cassel this year will meet at Bremen next year.

AT South Arcot (Presidency of Madras) experiments have been recently made with the fibres of aloes, which grow there in abundance, with a view of preparing paper from this material. A product was obtained which considerably surpassed the ordinary Indian paper in quality, and it is now intended to make the experiments on a larger scale in this country.

THE St. Gothard tunnel, which will measure 14,920 metres when completed, has now reached a length of 13,229 metres. It is hoped that by the beginning of December next the gigantic work will be finished.

THE additions to the Zoological Society's Gardens during the past week include a Guinea Baboon (*Cynocephalus sphinx*) from West Africa, presented by Mr. F. Naylor; a White-fronted Capuchin (*Cebus albifrons*) from South America, presented by Major H. L. Gleig; a Black-faced Spider Monkey (*Ateles ater*), two Black Tortoises (*Testudo carbonaria*) from South America, two Martinican Doves (*Zenaida martini cana*) from the West Indies, presented by Capt. Henry King; a Plantain Squirrel (*Sciurus plantani*) from Java, presented by Miss Lizzie Casey; an Indian Jackal (*Canis aureus*) from India, presented by Mr. Thos. Thursfield, M.R.C.V.S.; a Demeraran Cock of the Rock (*Rupicola crocea*) from Demerara, presented by Mr. R. S. Fraser; a King Parrakeet (*Aprosmictus scapulatus*) from New South Wales, presented by Mr. Geo. Wood; a Red and Blue Macaw (*Ara macao*), a Red and Yellow Macaw (*Ara chloroptera*) from South America, deposited; an African Brush-tailed Porcupine (*Atherura africana*) from West Africa, a Vulpine Squirrel (*Sciurus vulpina*, var. *capistrata*) from North America, purchased.

THE BRITISH ASSOCIATION

REPORTS

Report of the Committee for exploring Caves in Borneo. Drawn up by Dr. J. Evans, F.R.S.—The Committee report that with the grant of 50*l.* from the Association, a similar grant from the Royal Society, and a farther sum of about 200*l.* from private sources, they have been able to prosecute an examination of various caves in Borneo, under the superintendence of Mr. A. S. Everett, who has devoted himself to the task for a period of nearly nine months.

The final report upon his work has not yet been received, but it appears from his letters and from the specimens which have been transmitted to this country, that nothing of special interest either from an anthropological or a geological point of view has resulted from his explorations. The animal remains discovered have all been of recent species; the human bones are probably of no great antiquity, and none of the few objects of human manufacture which have been found can be regarded as of palæolithic age.

Pending the arrival of Mr. Everett's final report it appears needless to enter into details; but it may be mentioned that upwards of twenty caves appear to have been explored, in a more or less complete manner, and the principal objects found, after examination by some of the members of the Committee, have been forwarded to the British Museum. Although the examination of these caves has not, as was hoped, thrown any light upon the early history of man in that part of the world, it is still satisfactory that the examination should have been made